

REMARKS

The Examiner again rejected claims 1-6, 11, 13, and 16-21 pursuant to 35 U.S.C. §102(b) as anticipated by Yoshihiro (JP 10-94519). Claim 11 was again rejected pursuant to 35 U.S.C. §102(b) as anticipated by Yoshiya (JP 02-161934). Claims 8-9 and 14 were again rejected pursuant to 35 U.S.C. §103(a) as being unpatentable over Yoshihiro and Yoshiya. Claims 13-15 were again rejected pursuant to 35 U.S.C. §103(a) as being unpatentable over Yoshiya and Mo, et al. (U.S. Patent No. 6,733,455). Claims 7, 10, and 12 were objected to as allowable if amended into independent form. Applicants respectfully request reconsideration of the rejections of claims 1-6, 8-9, 11 and 13-21, including independent claims 1, 5, 11, and 20. New argument is added below in italics.

Independent claim 1 recites determining a rate of change of a parameter and displaying a change in the parameter over time as a function of the rate of change. Yoshihiro does not disclose this limitation. Yoshihiro determine the shape of a blood vessel wall (paragraph 12). Using fluid dynamics, the rate of blood in the vessel is calculated (paragraph 31). For the fluid dynamics, a pressure is used to determine the rate or velocity (paragraphs 31 and 35-36). For each heart cycle phase, a new calculation is made based on a new wall shape (paragraph 47). For a given phase, the rate, pressure, and direction are calculated for a plurality of locations. However, rate is not rate of change. Pressure is not rate of change. Direction is not rate of change. Yoshihiro does not disclose determining rate of change.

The Examiner notes that Yoshihiro is concerned with determining changes in blood flow and cites to paragraph 7 as showing "rate of flow." However, Yoshihiro show changes in blood flow by determining a sequence of images, each showing rate, pressure, and direction. The user is left to visually perceive any changes in rate. The "rate-of-flow" in the translation is taught in a summary or means for solving the problem. In the detailed embodiment, the rate of flow is described as rate. A rate or a rate of flow is not a rate of change of flow. Velocity is not acceleration. Yoshihiro disclose determining a rate of flow, not a rate of change of flow. While the flow may be changing, Yoshihiro does not determine the change. Instead, the rate of flow is shown to the user. The user may perceive any change by viewing a sequence of images, but the rate of change is not determined and used for displaying as a function of the rate of change. The display is the rate-of-flow, not a function of the determined rate of change.

Independent claim 5 recites tracking a flow direction, identifying locations as a function of flow direction, and assigning display values as a function of other display values. Yoshihiro does not disclose these limitations. Yoshihiro determine flow direction and magnitude in a still picture (paragraphs 45-47). The animation of Figure 7 merely shows the calculations for a sequence of different times (paragraphs 47-48). The flow direction is calculated for each image, not tracked. Display values are calculated for each image independently.

The Examiner cites to tracking flow direction and magnitude as determining the flow direction and magnitude for each image. By making these calculations for each image in a sequence, the direction and magnitude are tracked as a function of time. However, claim 5 recites assigning second display values as a function of the first display values based on the tracking. Yoshihiro determine the direction and magnitude for each image. The display values for each image show the direction and magnitude. Yoshihiro do not assign second display values as a function of other display values where the location of the second display values is a function of the direction and magnitude for the first display values.

Independent claim 11 recites generating a first pattern for pixels of a first image and generating a second pattern for pixels associated with a second image, where the second pattern is responsive to the first pattern. Yoshihiro and Yoshiya do not disclose these limitations.

Yoshihiro use fluid dynamics to calculate flow rate, direction and pressure in each image of a sequence. The calculations of one image appear to be independent of the other images. Yoshihiro do not disclose the pattern for one image responsive to the pattern of another image.

The Examiner alleges the second pattern (figure 7B) is responsive to the first pattern (figure 7A) because the second pattern represents, through shift in the streams, the change in the first pattern over a time period. However, this relationship of the underlying flow between images does not provide a pattern responsive to another pattern. Each image in Yoshihiro is independent. The calculation for each image provides an independent pattern. The independent pattern is responsive to the underlying flow, but the flow for each image is independent. The flow may be similar due to similar vessel boundaries, but is independently calculated. The user may perceive a similarity or change, but the flows and resulting pixel values are independent. One pattern is not responsive to another pattern.

Yoshiya determine velocities for each of a sequence of images (page 4, 2nd to last paragraph). Acceleration between pairs of velocity images is determined (page 4, last paragraph and page 5, 5th and 6th paragraphs). The acceleration is displayed as a gray stripe in a color flow map (page 5, 6th paragraph). By determining acceleration between different pairs of images, a sequence of acceleration images may be generated (page 6, 2nd-4th paragraphs). Yoshiya determine acceleration for each image independently of acceleration for a previous image. Yoshiya do not suggest one pattern being responsive to another pattern.

The Examiner notes the overlap of velocity information (i.e., one frame of velocity being used for different acceleration images- $a1=v1-v2$ and $a2=v2-v3$ where $v2$ is used in both). However, claim 11 recites the pattern as pixels for images, not underlying data used to calculate display values. The acceleration of one image is not used for another image. The overlap of velocity information does not alter this. Acceleration is not provided by a single frame of velocity. Two acceleration images both being a function of a same frame of velocity does not result in the final acceleration pattern of one image being responsive to an acceleration pattern of another image.

Independent claim 20 recites a persistent pattern shifted in an image relative to another image. Yoshihiro calculates the pattern for each image independently. Any pattern similarity is arbitrary, and is not a persistent pattern shifting in an image.

The underlying streams or flow is not a pattern in an image. The image may represent flow patterns, but the patter in an image is not shifted as a persistent image pattern.

Dependent claims 2-4, 6, 8-9, 13-19, and 21 depend from one of the independent claims above, so are allowable for the same reasons. Further limitations patentably distinguish from the cited references.

Claims 2-4 recite rate of change, so are allowable.

Claim 6 recites a pattern of one image responsive to a pattern of another image, so is allowable.

Claims 18 and 19 recite a shifted pattern, so are allowable.


Claim 21 recites tracking and values of one image being a function of values of another image, so is allowable.

CONCLUSION:

Applicants respectfully submit that all of the pending claims are in condition for allowance and seeks early allowance thereof. If for any reason, the Examiner is unable to allow the application but believes that an interview would be helpful to resolve any issues, he is respectfully requested to call the undersigned at (650) 943-7554 or Craig Summerfield at (312) 321-4726.

PLEASE MAIL CORRESPONDENCE TO: Respectfully submitted,

Siemens Corporation
Customer No. 28524
Attn: Elsa Keller, Legal Administrator
170 Wood Avenue South
Iselin, NJ 08830


Anand Sethuraman, Reg. No. 43,351
Attorney(s) for Applicant(s)
Telephone: 650-943-7554
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